ELTEK VALERE
always on

RECTIFIER

PSR308

(Incl. Version 2)

USER MANUAL

UM_PSR308_E_R7.0

Notes on this manual

ATTENTION! Read this manual very carefully before installing and commissioning the specified module. This manual is a part of the delivered module. Familiarity with the contents of this manual is required for installing and operating the specified module.
The rules for prevention of accidents for the specific country and the general safety rules in accordance with IEC 364 must be observed.

The function description in this manual corresponds to the date of publishing.
Technical changes and changes in form and content can be made at any time by the manufacturer without notice. There are no obligations to update the manual continually.

The module is manufactured in accordance with applicable DIN and VDE standards such as VDE 0106 (part 100) and VDE 0100 (part 410). The CE marking on the module confirms compliance with EU standards 2006-95-EG (low voltage) and 2004-108-EG (electromagnetic compatibility) if the installation and operation instructions are followed.

Changes and errors excepted.

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02	Page “Current revision status” inserted, correction of the connector drawing, minor text modification point 4.3.	RTH	2007-06-29
03	Layout change, several additional pictures inserted	RTH	2007-11-05
04	Minor text modification, section “Commissioning” reworked	RTH	2008-04-07
05	Minor text modification, section 3.6	SP	2008-07-31
06	Minor text modifications, “Output is not SELV” inserted in section 8, “Index of figures” inserted	RTH	2008-10-09
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2.0	Indication of the input voltage range/tolerance changed.	RTH	2009-01-22
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6.0	"Version 2" integrated.	RTH	2010-03-23
7.0	Table "Pin assignment of the rear side connector" corrected.	RTH	2010-04-29

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1A. Safety Instructions

Warning!

Because several components of operating electrical modules are charged by dangerous voltage, the improper handling of electrical modules may be the cause of accidents involving electrocution, injury, or material damages.

- Operation and maintenance of electrical modules must be performed by qualified skilled personnel such as electricians in accordance with EN 50110-1 or IEC 60950.
- Install the module only in areas with limited access to unskilled personnel.
- Before starting work, the electrical module must be disconnected from mains. Make sure that the module is earthed.
- Do not touch connector pins as they can be charged with dangerous voltage up to 30 seconds after disconnection.
- Only spare parts approved by the manufacturer must be used.

1B. Electric Waste Disposal

Separate collection is the precondition to ensure specific treatment and recycling of waste electrical and electronic equipment and is necessary to achieve the chosen level of protection of human health and the environment.

In the case of waste disposal of your discarded equipment we recommend to contact a waste management company.

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2. General Information

The rectifier PSR308 rectifies sinusoidal AC input voltage to DC output voltage. The PSR308 is a hot-plug-in module with rear side connectors and is designed to be mounted in an assembly set 19" sub rack according to section 3.2. Due to its state-of-the-art circuitry design, the unit has very low losses and therefore very compact dimensions, low weight and high power density. The PSR308 can be used in all DC applications with or without battery (the module is suitable for lead acid batteries as well as for NiCd batteries). The rectifier is delivered with factory set default values for **lead acid batteries**. If the rectifier is to be used for **NiCd batteries**, the default values must be parameterized accordingly using a CAN dongle and special software.
The nominal output power per unit is 800W (600W at input voltage <173V_{AC}). Up to a maximum of 48 modules can be switched in parallel to increase the system output power or to build redundant power supply systems (n + 1-principle).

2.1 Information about version 2

At PSR308 version 2 the firmware has been upgraded to get an optimized load sharing for parallel working rectifiers.
Backward compatibility: The new version should not be paralleled with units with older firmware because the current sharing will be poor which means, that a mix of old and new versions can cause bad current sharing between the units.
NOTE: It will not cause any harm to the unit if they are mixed; only the current sharing is affected.

3. Type Range/Equipment

The following table shows the available versions of the PSR308 rectifiers:

	Type description	Article code	Nominal output voltage	Maximum output current
Version 1	PSR308/24-30 WIR	101-008-947.00	24V_{DC}	30A_{DC}
	PSR308/48-16.6 WIR	101-008-957.00	48V_{DC}	16.7A_{DC}
	PSR308/60-13.5 WIR	101-008-967.00	60V_{DC}	13.5A_{DC}
	PSR308/110-7.5 WIR	101-008-977.00	108V_{DC}	7.5A_{DC}
	PSR308/220-3.7 WIR	101-008-987.00	216V_{DC}	3.7A_{DC}
Version 2	PSR308/24-30 WIR	101-008-947.02	24V_{DC}	30A_{DC}
	PSR308/48-16.6 WIR	101-008-957.02	48V_{DC}	16.7A_{DC}
	PSR308/60-13.5 WIR	101-008-967.02	60V_{DC}	13.5A_{DC}
	PSR308/110-7.5 WIR	101-008-977.02	108V_{DC}	7.5A_{DC}
	PSR308/220-3.7 WIR	101-008-987.02	216V_{DC}	3.7A_{DC}

3.1 Main data

AC input voltage:	110 up to 250V_{AC} (WIR= Wide Input Range)
AC input voltage tolerance:	-20/+10%
AC input current:	5.5A_{AC} @120V_{AC}/3.9A_{AC} @230V_{AC}
Input Frequency:	47- 63 Hz
Nominal Output Power:	800W (600W @ Vi < 173V_{AC})

For more specific data, see section 8.

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3.2 Available options and assembly equipment:

Designation	Material Code
DC Power Rack DCR PSR308-4.8 LV (assembly set 19" sub rack 4U incl. backplane for max. six rectifiers PSR308/24V up to 60V; incl. fan rack)	102-308-607.LV02
DC Power Rack DCR PSR308-4.8 HV (assembly set 19" sub rack 4U incl. backplane for max. six rectifiers PSR308/110V or 220V; incl. fan rack)	102-308-607.HV02
DC Power Rack DCR PSR308-4.0 LV (assembly set 19" sub rack 4U incl. backplane for max. five rectifiers PSR308/24V up to 60V and one DC controller UPC3S-24 up to 60V; incl. fan rack)	102-308-517.LV02
DC Power Rack DCR PSR308-4.0 HV (assembly set 19" sub rack 4U incl. backplane for max. five rectifiers PSR308/110V or 220V and one DC controller UPC3S-110V or 220V; incl. fan rack)	102-308-517.HV02
Fan rack 19" 1U incl. 6 fans, for DC voltage from 24 up to 60 V (spare part)	102-308-FR1.LV02
Fan rack 19" 1U incl. 6 fans, for DC voltage from 110 up to 220 V (spare part)	102-308-FR1.HV02
Cover plate, with handle, necessary to cover empty slots, 1/6 x 19", 3U; RAL 7035	881-MEC-BPL.03.14.B
Monitoring, controlling and signalling unit (DC controller) UPC3S 24V	301-003-497.02
Monitoring, controlling and signalling unit (DC controller) UPC3S 48/60V	301-003-597.02
Monitoring, controlling and signalling unit (DC controller) UPC3S 110V	301-003-797.02
Monitoring, controlling and signalling unit (DC controller) UPC3S 220V	301-003-897.02
CAN dongle, incl. PC software; necessary to change the internal default values of the rectifier (e.g. for NiCd application).	880-CAN-DNG.00

Figure 1.) DC Power Rack DCR PSR308-4.0
fully equipped with
five rectifiers PSR308 and
one DC controller UPC3S

Figure 2.) DC Power Rack DCR PSR308-4.8
fully equipped with
six rectifiers PSR308

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3.3 Front view/front LED panel

Figure 3.) Front view

The PSR308 rectifier is equipped with the following four LED indicators:

INPUT OK
OUTPUT OK
Vout>
ALARM

For more information about the LED indicators, see section 4.4

Two captive screws at the top and the bottom of the module are used for each module to secure it to the subrack (components of the module).

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3.4 Rear side connection

The rear side male connections (AC input, DC output & signals) are shown in Figure 4.) and defined in the following table.

Pin assignment of the rear side connector:

Pin	Function
2b	-
5b	(-) -Output
8b	-
11b	(+) -Output
13a	CAN-CVSS
13c	(-) output voltage sense link
14a	CAN–H
14c	CAN–L
15a	-
15c	CAN-CVCC
16a	AGND
16c	-
17a	Hardware coding CODE2
17c	Hardware coding CODE1
18a	General fault (alarm) NC
18c	General fault (alarm) COM
19a	General fault (alarm) NO
19c	-
20a	-
20c	(+) output voltage sense link
22b	PE
25b	-
28b	N-Input
31b	L1-Input

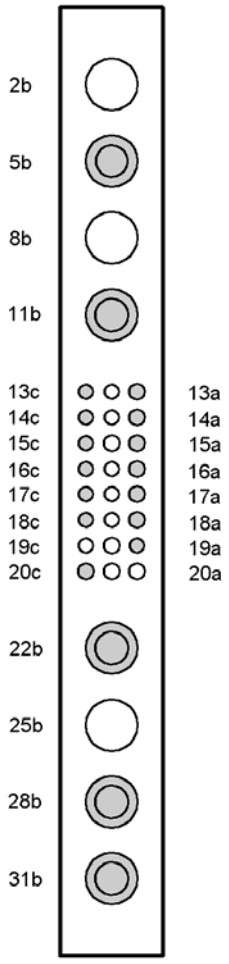

Figure 4.) Male connector (shown from the rear side of the module)

3.5 Cooling/air flow direction

It is recommended to operate the PSR308 forced cooled with fan rack according to section 3.2 (the fan rack is a component of the sub rack). The air flows in vertical direction through the module. To provide sufficient air flow, a minimum space (see item "A" in figure 5) of 2U (approx. 90 mm) between the unit and the top cover of the cabinet as well as an unobstructed supply of air from the bottom is necessary.

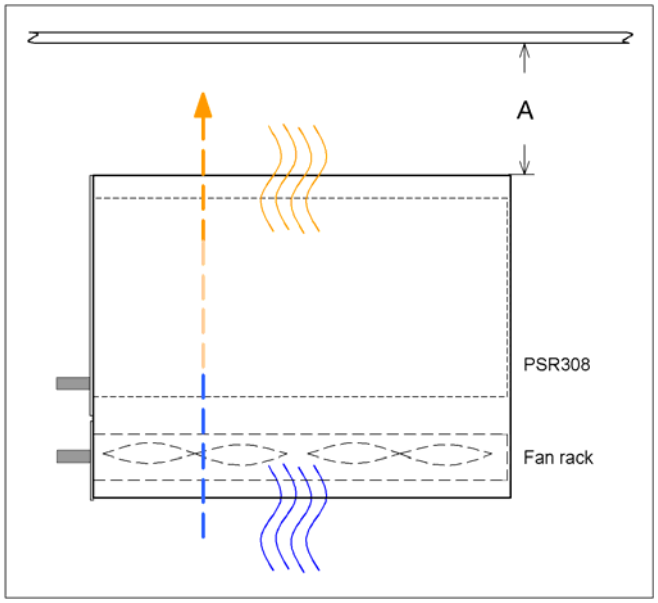

Figure 5.) Sub rack air flow

3.6 Communication interface

The PSR308 rectifier is equipped with a serial data interface in accordance with the Controller Area Network (CAN) specification. The CAN-Bus connection is integrated into the rear side connector.
Via CAN-Bus, several devices in a system or parallel connection can be controlled and monitored by a central DC controller unit UPC3S.

Following parameters of a specific rectifier unit can be controlled and monitored:

- Output voltage
- Output current
- Module temperature
- Module status

Furthermore the rectifier unit receives all threshold values through the CAN-Bus from the DC controller unit.

REMARK: The CAN-Bus is not for external use!

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4. Handling

4.1 Storage

The modules must be stored in a dry, dust free environment with a storage temperature in accordance with the specific technical data (see section 8).

4.2 Commissioning

Note: Before commissioning the module make sure that the input voltage corresponds to the input voltage range of the unit as specified on the type plate and that the output voltage of paralleled units matches.

1. Carefully unpack the unit
2. Fill the rack beginning with the left slot.
3. Put the unit into an empty slot.
4. Carefully slide in the unit until the module connector touched the backplane connector.
5. Increase the force until the unit fits in completely. Avoid using too much force. If the unit does not fit in, begin again at step 3.
6. Secure the module using the two captive screws (M3x12) provided with the module.

Note: The PSR308 is serially equipped with an internal output side decoupling diode. This ensures hot plug-**in** capability for the module and enables the operator to **add** modules under operating conditions.

Note: Before a module is to be **removed**, it must be **switched off** by the external input fuse!

Caution: After switching off the module the internal capacitors are still fully charged. Do not touch connector pins as they can still be charged with dangerous voltage after disconnection.

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4.3 Charge characteristic/output power diagram

The charge characteristic of the PSR308 is a power limited IV characteristic curve in accordance with DIN 41772/DIN 41773.
For modules in parallel operation mode a load distribution of approx. ±10% is attained due to a sloping output voltage line (-1% at 100% Inom).
The module is continuous short circuit proof due to constant current control.

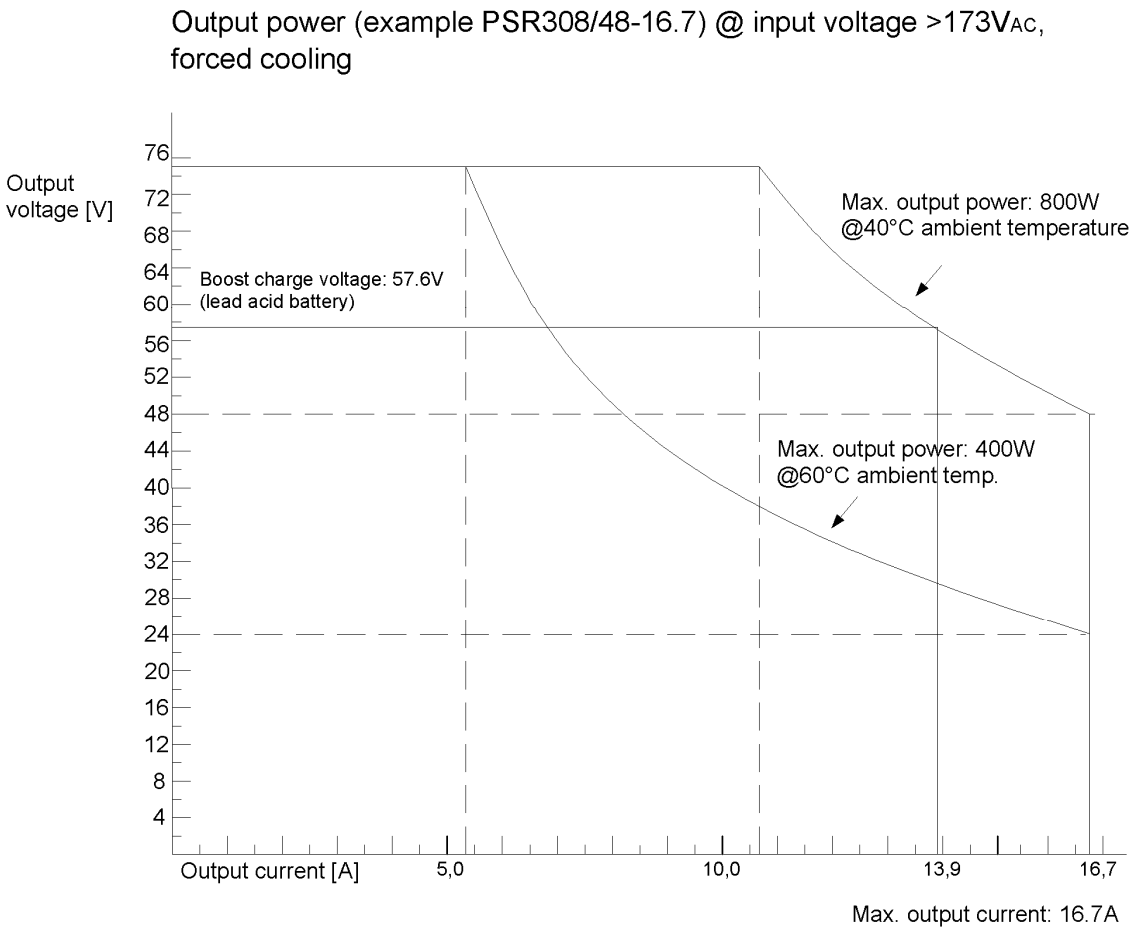

Figure 6.) Output power diagram (example PSR308/48-16.7)

Example: Calculation of the output current at different output voltage values

Vonom x Ionom= Ponom (48V x 16.7A= 800W)

As you can see on the basis of the above example (see figure 6.), the maximum output current (16.7A) is available at ≤ nominal output voltage (48.0V).
At output voltage values according to the float or boost charging mode, the output current is corresponding to the following formula: Io= Ponom : Vo

Float charge voltage for lead acid batteries (24 cells) = 54.5V; **Io**= 800W : 54.5V= **14.7A**

Boost charge voltage for lead acid batteries (24 cells) = 57.6V; **Io**= 800W : 57.6V= **13.9A**

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4.4 LED indications

Functions of front panel LED indicators

LED	Colour	Function
	green	INPUT OK - Mains input voltage ok (criteria: 80V_{AC} ≤ Vn ≤287V_{AC})
	green	OUTPUT OK - Vout ok (criteria: Vout ≥85% of adjusted value)*
	red	Vout > (criteria: Vout ≥ than adjusted over voltage threshold)*
	red	ALARM – Collective alarm**: Vin incorrect, Vout incorrect, module over temperature and short circuit

*For factory set output voltage threshold values, see section 4.6

**The module is equipped with an isolated signalling contact (normally open contact).
The maximum load is 60V_{DC}/500mA. The contact is time-delayed and reacts after approx. 10 sec.

4.5 Internal monitoring

Monitored values	Criteria	Function
AC input voltage	I.) Mains input voltage less than 173V II.) Mains input voltage 80V ≤Vin ≤287V	I.) The module switches over to an output power of 600W. II.) The module automatically switches off.
DC output voltage	Output voltage higher than the adjusted over voltage threshold*	The module automatically switches off (self locking if output current is flowing). The unit must be manually restarted.
Module temperature	Cooling plate temperature ≥80°C	The device automatically switches off. It automatically switches on when the cooling plate cools down to ≤70°C.

*For factory set output voltage threshold values, see section 4.6

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4.6 Threshold & default values

The following table shows the factory set threshold/default values internally stored in the PSR308 unit (for **lead acid batteries**):

Default values	24V version	48V version	60V version	110V version	220V version
Vo (V_{DC})	27.24	54.5	68.1	122.6	245.2
V> (V_{DC})	30.0	60.0	75.0	135.0	270.0
Iconst (A_{DC})	30.0	16.7	13.5	7.5	3.7

Note: The threshold/default values can only be changed in combination with a UPC3 DC controller unit.

If an UPC3 DC controller unit is controlling the power supply unit through the CAN-Bus, the charge voltage is completely controlled by the UPC3 based on its configuration values and momentary charge state (for example temperature compensation, boost charge, or battery test). That means that the values sent from the UPC over CAN-Bus have top priority. During CAN-Bus communication the internally stored values of the rectifier are invalid.
But when the CAN-Bus connection is inactive for more than five seconds (e. g. due to trouble), the PSR308 automatically switches back to the internally stored default values. In this case it is ensured that the battery is charged in the float charge mode.

4.7 Default value setting for NiCd batteries

If the rectifier is to be used to charge **NiCd batteries** the default/threshold values must be set according to the individual battery type using a CAN dongle and PC software (see section 3.2 “Available Options and Assembly Equipment”). A specific manual is available on request. For the adjusting range of the output voltage please see section 8 “Technical Specifications”.

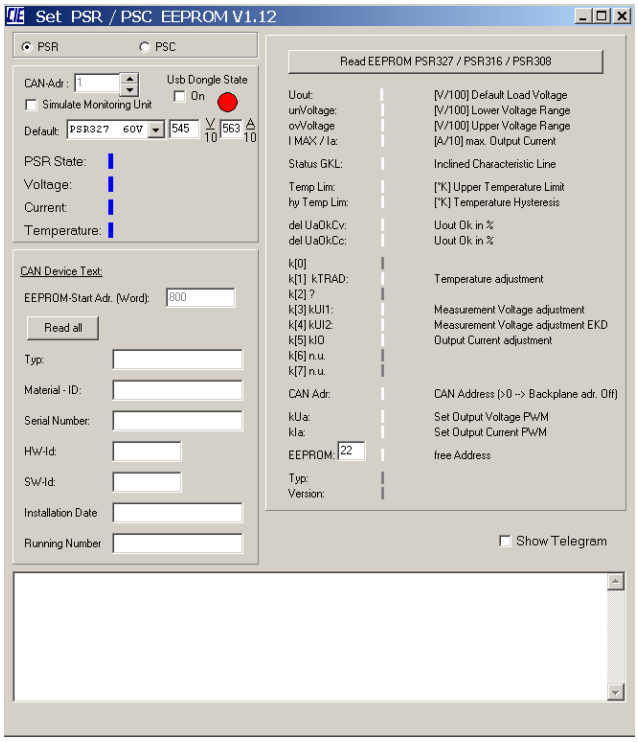

Figure 7.) Screenshot “PC software for CAN-Dongle”

5. External Functions

If the rectifier works together with a UPC3S DC controller unit, the following external functions can be used:

- Compensation of output voltage
- Temperature compensation of charge voltage
- Discharge test
- Boost charge mode

For more information about these functions, read the UPC3S user manual.

6. Maintenance

In general, the PSR308 is maintenance-free.
By way of precaution a yearly inspection with following checks is recommended:

- Mechanical inspection
- Removal of dust and dirt, especially on radiator surfaces
- Check for internal dust or humidity

Attention! Dust combined with moisture or water may influence or destroy the internal electronic circuits.
Dust inside the unit can be blown out with dry compressed air.
The interval between the checks depends on ambient conditions of the installed module.

7. Troubleshooting

Symptom	Possible reason	Corrective action
No output voltage	Is mains voltage present?	Check
	Mains switched to “ON” position?	Check
	PSR308 module plugged in securely?	Check
	Incorrect polarity or short circuit at the output?	Check
	LED V> on?	1.) Switch the module off and on. 2.) Check the settings for V> (see section 4.6).
Deviation of the output voltage	Is the unit operating in current limiting mode due to overload?	Reduce the load
	Is the output voltage setting Vout at the DC controller incorrect?	Adjust output voltage to nominal values (see section 4.6)
	If an external sensor lead is used for the output voltage, is the connection faultless?	Check

If the unit still does not work even though all checks have been done, contact your sales agent or the ELTEK VALERE DEUTSCHLAND service department.

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8. Technical Specifications

Type designation	PSR308/24-30 WIR	PSR308/48-16.7 WIR	PSR308/60-13.5 WIR	PSR308/110-7.5 WIR	PSR308/220-3.7 WIR
Article code (version 1)	**101-008-947.00**	**101-008-957.00**	**101-008-967.00**	**101-008-977.00**	**101-008-987.00**
Article code (version 2)	**101-008-947.02**	**101-008-957.02**	**101-008-967.02**	**101-008-977.02**	**101-008-987.02**
AC input:					
Input voltage	110 - 250VAC	←	←	←	←
Input voltage tolerance	-20/+10%	←	←	←	←
Input current @ 230VAC	3.9AAC	3.9AAC	3.9AAC	3.9AAC	3.9AAC
Input current @ 120VAC	5.5AAC	5.5AAC	5.5AAC	5.5AAC	5.5AAC
Input frequency range	47- 63Hz	←	←	←	←
Power factor	≥0.99 @ Pnom ≥50%				
Total harmonic distortion	<5%	←	←	←	←
Efficiency	≥90%	←	←	←	←
Internal input fusing	10A (5x20mm)	←	←	←	←
DC output:					
Nominal output voltage	24VDC	48VDC	60VDC	108VDC	216VDC
ATTENTION: The output does not correspond to SELV!					
Maximum output current	30ADC	16.7ADC	13.5ADC	7.5ADC	3.7ADC
Nominal output power	800W (600W @ input voltage <173VAC); power derating at higher temperatures				
Charge characteristic	IV characteristic according to DIN41772/DIN41773; power limited				
Adjustable output voltage range	19- 36VDC	38- 75VDC	48- 88.5VDC	87- 160VDC	172- 313VDC
Factory set default value of the charging voltage for lead acid batteries*	27.24VDC (2.27 V/cell; lead acid battery)	54.5VDC (2.27 V/cell; lead acid battery)	68.1VDC (2.27 V/cell; lead acid battery)	123VDC (2.27 V/cell; lead acid battery)	245VDC (2.27 V/cell; lead acid battery)
Output over voltage V> (factory set, 2.5V/cell; lead acid battery*)	≥30VDC	≥60VDC	≥75VDC	≥135VDC	≥270VDC
Output under voltage Vo< (factory set, 1.7V/cell; lead acid battery*)	20.4VDC	40.8VDC	51VDC	91.8VDC	183.6VDC

*Default/threshold values for charging **NiCd batteries** are settable using a CAN dongle and PC software.

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Type designation	**PSR308/24-30 WIR**	**PSR308/48-16.7 WIR**	**PSR308/60-13.5 WIR**	**PSR308/110-7.5 WIR**	**PSR308/220-3.7 WIR**
Voltage ripple / psophometric acc. to CCITT-A	≤20mVpp/ ≤1.2mV	≤20mVpp/ ≤1.8mV	←	≤100mVpp/ n/a	≤200mVpp/ n/a
Dynamic accuracy of the charge voltage	<3% Vnom at load changes between 10%-90%-10% Inom; transient time ≤1ms				
Short circuit protection	continuous short circuit proof; 1 x Inom				
Parallel operation	yes (max. 48 units with DC controller unit UPC3S); current sharing ≤10% Inom				
Internal decoupling at the output	yes; active low loss decoupling circuit in the negative output line				
Internal output fuse	40A	25A	20A	10A	5A
Standard Features:					
LED signalling	Operation (green), Vo OK (green), Vo> (red), Alarm (red)				
Main processor	16 Bit Fujitsu	←	←	←	←
Isolated signalling contact	"General fault"; maximum load: 60VDC/500mA				
Communication interface	CAN-Bus (not for external use), proprietary protocol				
Environmental:					
Ambient temperature	Operation: -20°C to +45°C; storage: -40°C to +85°C				
Climatic conditions	according to IEC 721-3-3 class 3K3/3Z1/3B1/3C2/3S2/3M2				
Max. installation altitude	1500m	←	←	←	←
Audible noise	30dBA	←	←	←	←
Mechanical:					
Type of construction	1/6 x 19", 3U	←	←	←	←
Cooling	Forced cooling with fan rack 1U or convection cooling (max. 600W)				
Connections	AC input, DC output and signalization: DIN41612-M-connector				
Dimensions (W/H/D)	71/128/285mm	←	←	←	←
Min. installation depth	368mm with sub rack				
Weight	approx. 2.2kg	←	←	←	←
Type of enclosure / Protection class	IP20 (front panel)/1				
Colour	Front panel: RAL 7035, neutral, black print RAL 9005				

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Compliances:					
CE conformity	yes	←	←	←	←
Compliance to safety standards	EN60950-1; VDE0100 T410; VDE0110; EN50178; EN60146				
Compliance to EMC standards	EN55022/24 class “B“, ITE Devices; EN61000-4 T2-5				

8.1 Dimensional drawings:

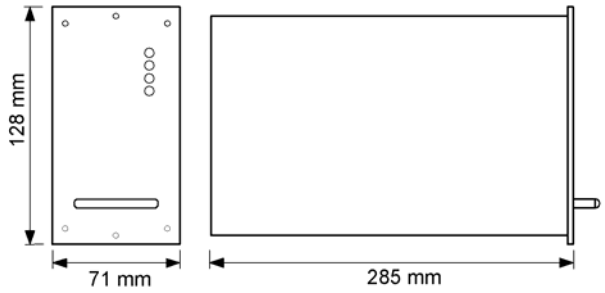

Figure 8.) Module dimensions

9. Notes

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